# User Manual

# F216 - 3U CompactPCI®
# Octal UART

*Configuration example*

# F216 - 3U CompactPCI® Octal UART

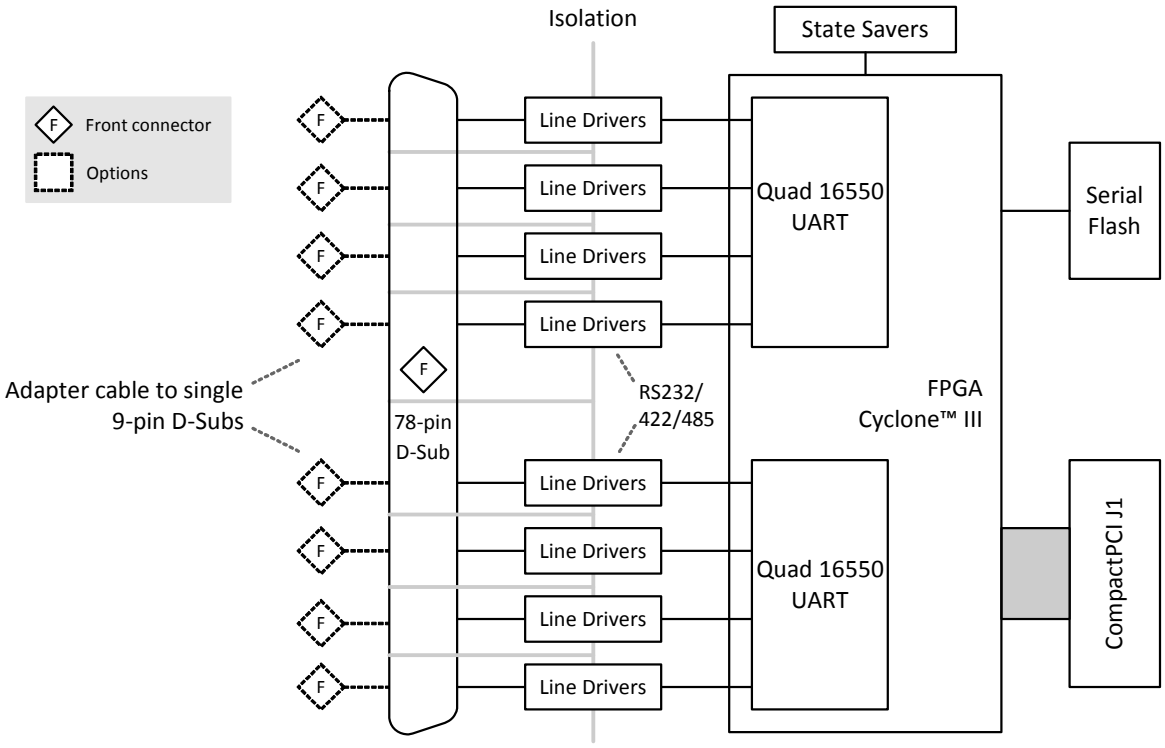
The F216 is an octal UART I/O board based on 3U CompactPCI®. Two UART controllers provide four full-duplex serial channels each. The physical layers are integrated on the board: each of the eight channels can be individually configured as single-ended RS232 or differential RS422 or RS485. The default setting is RS422.

The UART controller supports high data rates up to 921 600 bit/s, depending on the physical interface type. Its register set is fully 16550D compatible, even with larger, 60-byte FIFOs.

Each channel of the F216 has its own 500V isolation, with all ports being available on one 78-pin D-Sub connector. An adapter cable is also available to spread the 78-pin connector to eight standard 9-pin D-Sub connectors.

The F216 is designed for use in rugged environments. For example, all components are specified for an operating temperature of -40 to +85°C. The card easily expands CompactPCI® systems by an additional eight UARTs on 4 HP where the CPU does not provide enough COM interfaces.

# Diagram


Isolation
State Savers
Front connector
Options
F
Line Drivers
Quad 16550
UART
Serial
Flash
Adapter cable to single
9-pin D-Subs
78-pin
D-Sub
RS232/
422/485
FPGA
Cyclone™ III
CompactPCI J1

# Technical Data

### UART Interfaces

- Eight RS232/RS422/RS485 UARTs
- Software-configurable
- Default at start-up: RS422, can be customized through non-volatile state saver
- Two 16Z125_UART controllers with four UARTs each
- Data rates:
  - Up to 921,600 bit/s with RS422/RS485
  - Up to 230,400 bit/s with RS232
- 60-byte transmit/receive buffer
- Handshake lines: full support with RS232
- Full-duplex operation with RS422, half-duplex operation with RS485
- Isolation between channels: 500V
- Accessible on front-panel 78-pin D-Sub connector

### Miscellaneous

- Four status LEDs at front panel
  - One status LED to signal FPGA configuration (UARTs ready)
  - Three user LEDs, FPGA-controlled by 16Z034_GPIO controller

### CompactPCI® Bus

- Compliance with CompactPCI® Core Specification PICMG 2.0 R3.0
- Peripheral slot
- V(I/O): +3.3V (+5V tolerant)

### Electrical Specifications

- Supply voltage/power consumption:
  - +5V (-3%/+5%), 430mA
  - +3.3V (-3%/+5%), 170mA

### Mechanical Specifications

- Dimensions: conforming to CompactPCI® specification for 3U boards
- Front panel: 4HP with ejector
- Weight: 182g

### Environmental Specifications

- Temperature range (operation):
  - -40..+85°C (qualified components)
  - Airflow: min. 1m/s
- Temperature range (storage): -40..+85°C
- Relative humidity (operation): max. 95% non-condensing
- Relative humidity (storage): max. 95% non-condensing
- Altitude: -300m to + 3,000m
- Shock: 15g/11ms
- Bump: 10g/16ms
- Vibration (sinusoidal): 2g/10..150Hz
- Conformal coating on request

### MTBF

- 96,149h @ 40°C according to IEC/TR 62380 (RDF 2000)

### Safety

- PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers

### EMC

- Conforming to EN 55022 (radio disturbance), IEC1000-4-2 (ESD) and IEC1000-4-4 (burst)

### Software Support

- Driver software for Windows®, Linux, VxWorks®, QNX®
- For more information on supported operating system versions and drivers see online data sheet.

# Product Safety

## Electrostatic Discharge (ESD)

Computer boards and components contain electrostatic sensitive devices. Electrostatic discharge (ESD) can damage components. To protect the board and other components against damage from static electricity, you should follow some precautions whenever you work on your computer.

- Power down and unplug your computer system when working on the inside.
- Hold components by the edges and try not to touch the IC chips, leads, or circuitry.
- Use a grounded wrist strap before handling computer components.
- Place components on a grounded antistatic pad or on the bag that came with the component whenever the components are separated from the system.
- Store the board only in its original ESD-protected packaging. Retain the original packaging in case you need to return the board to MEN for repair.

# About this Document

This user manual is intended only for system developers and integrators, it is not intended for end users.

It describes the hardware functions of the board, connection of peripheral devices and integration into a system. It also provides additional information for special applications and configurations of the board.

The manual does not include detailed information on individual components (data sheets etc.). A list of literature is given in the appendix.

## History

| Issue | Comments | Date |
|---|---|---|
| E1 | First edition | 2008-08-07 |
| E2 | Minor errors corrected; Windows package available; baud rate parameter values for Linux and VxWorks corrected; 5V V(I/O) added | 2008-12-12 |
| E3 | 5V V(I/O) corrected (tolerant, not universal board); note added to chapter 2.2.4.6 | 2009-03-19 |
| E4 | Added note in chapter 2.2.4.2 | 2010-12-13 |
| E5 | Changes made to chapter 2.2.4.2 UART ports | 2014-01-13 |

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This sign marks important notes or warnings concerning the use of voltages which can lead to serious damage to your health and also cause damage or destruction of the component.

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*italics* — Folder, file and function names are printed in *italics*.

**bold** — **Bold** type is used for emphasis.

`monospace` — A `monospaced` font type is used for hexadecimal numbers, listings, C function descriptions or wherever appropriate. Hexadecimal numbers are preceded by "0x".

*comment* — Comments embedded into coding examples are shown in green color.

hyperlink — Hyperlinks are printed in blue color.

The globe will show you where hyperlinks lead directly to the Internet, so you can look for the latest information online.

IRQ# /IRQ — Signal names followed by "#" or preceded by a slash ("/") indicate that this signal is either active low or that it becomes active at a falling edge.

in/out — Signal directions in signal mnemonics tables generally refer to the corresponding board or component, "in" meaning "to the board or component", "out" meaning "coming from it".

Vertical lines on the outer margin signal technical changes to the previous issue of the document.

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# 1 Getting Started

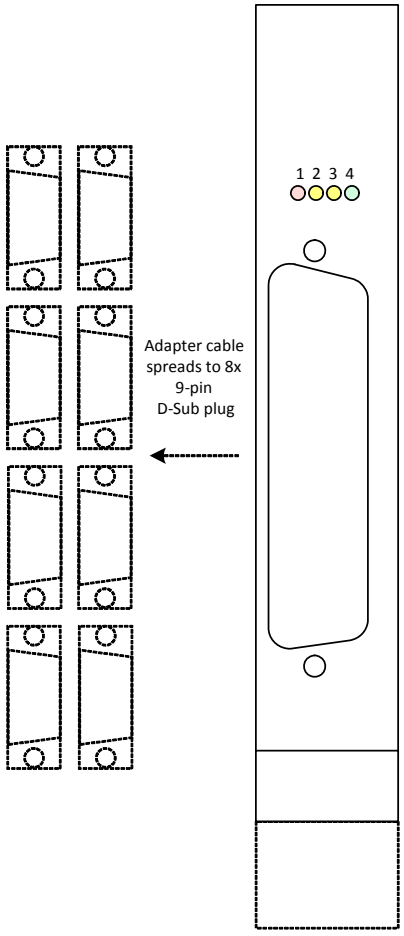
This chapter gives an overview of the board and some hints for first installation in a system.

## 1.1 Front Panel and Interfaces

The F216 has one 78-pin D-Sub front connector that includes the signals of all eight UARTs. An adapter cable is available from MEN to spread the 78-pin connector to eight standard 9-pin D-Sub plug connectors.

For ordering information please see the F216 data sheet on MEN's website.
For more information on the UART functions and pin assignments of the 78-pin connector see Chapter 2.2 UART Interfaces on page 16.
For more information on the four front-panel LEDs please see Chapter 2.3 Front-Panel LEDs on page 26.

***Figure 1.*** *Front panel and interfaces*



## 1.2 Integrating the Board into a System

You can use the following check list when installing the board in a system for the first time.

- ☑ Power-down the system.
- ☑ Insert the F216 into a peripheral slot of your CompactPCI system, making sure that the CompactPCI connectors are properly aligned.

  Note: The peripheral slots of every CompactPCI system are marked by a circle ○ on the backplane and/or at the front panel.
- ☑ Power-up the system.
- ☑ You can now install driver software for the F216 UART controllers.

## 1.3 Installing Driver Software

For a detailed description on how to install driver software please refer to the respective documentation.

You can find any driver software available for download on MEN's website.

MEN drivers allow you to set the physical layer of the UART interface through software. The board supports differential RS422 (standard default) and RS485, and non-differential (single-ended) RS232.

See also Chapter 2.2.4 Setting the Physical Layer on page 23.

# 2 Functional Description

## 2.1 Power Supply

Power supply is fed via the CompactPCI backplane. The board operates on +3.3 V and +5 V.

## 2.2 UART Interfaces

The F216 offers eight standard UARTs that can be configured as a differential RS422 (full duplex) or RS485 (half duplex), or a non-differential (single-ended) RS232 interface with full handshake support. The physical layer is set individually for each channel through software. See Chapter 2.2.4 Setting the Physical Layer on page 23 for more details.

Two UART controllers inside an onboard FPGA provide four full-duplex serial channels each. The register set of the octal UART is fully 16550D compatible. High data rates up to 921,600 bits/s are possible, depending on the physical interface type selected. See Chapter 2.2.4.6 Supported Baud Rates on page 25 for an overview of supported baud rates.

Each channel of F216 has its own 500 V isolation.

### 2.2.1 Connection

All UART ports are available on one 78-pin D-Sub connector. An adapter cable is also available to spread the 78-pin connector to eight standard 9-pin D-Sub connectors. (See Figure 1, Front panel and interfaces on page 14 and Chapter Pin Assignments of 9-pin D-Sub Connectors on page 20.)

Connector types:

- 78-pin high-density D-Sub receptacle, 2.54mm pitch, clinch nut 4-40 UNC

Mating connector:

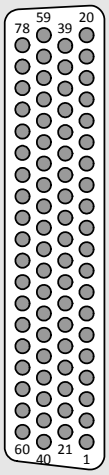
- 78-pin high-density D-Sub plug

***Table 1.*** *Signal mnemonics of UART interfaces*

| Mode | Signal | Direction | Function |
|---|---|---|---|
| All modes | IGND[8:1] | - | Isolated ground |
| RS422 | RX[8:1]+/- | in | Differential receive data |
| | TX[8:1]+/- | out | Differential transmit data |
| RS485 | D[8:1]+/- | in/out | Differential transceive data |

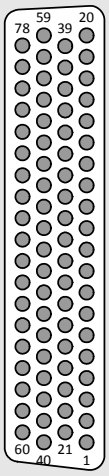
| Mode | Signal | Direction | Function |
|---|---|---|---|
| RS232 | CTS[8:1] | in | Clear to send |
| | DCD[8:1] | in | Data carrier detected |
| | DSR[8:1] | in | Data set ready |
| | DTR[8:1] | out | Data terminal ready |
| | RI[8:1] | in | Ring indicator |
| | RTS[8:1] | out | Request to send |
| | RXD[8:1] | in | Receive data |
| | TXD[8:1] | out | Transmit data |

***Table 2.*** *Pin assignment of the 78-pin front connector – RS422 mode, full duplex*



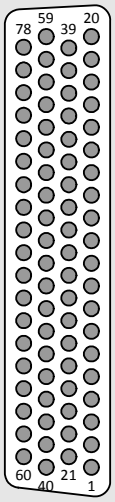

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 78 | - | 59 | - | 39 | IGND5 | 20 | - |
| 77 | - | 58 | - | 38 | - | 19 | - |
| 76 | RX1+ | 57 | RX1- | 37 | RX5+ | 18 | RX5- |
| 75 | - | 56 | - | 36 | - | 17 | - |
| 74 | TX1+ | 55 | TX1- | 35 | TX5+ | 16 | TX5- |
| 73 | IGND1 | 54 | - | 34 | - | 15 | - |
| 72 | - | 53 | IGND2 | 33 | - | 14 | IGND6 |
| 71 | RX2+ | 52 | RX2- | 32 | RX6+ | 13 | RX6- |
| 70 | - | 51 | - | 31 | - | 12 | - |
| 69 | TX2+ | 50 | TX2- | 30 | TX6+ | 11 | TX6- |
| 68 | - | 49 | - | 29 | - | 10 | - |
| 67 | RX3+ | 48 | RX3- | 28 | RX7+ | 9 | RX7- |
| 66 | - | 47 | - | 27 | - | 8 | - |
| 65 | TX3+ | 46 | TX3- | 26 | TX7+ | 7 | TX7- |
| 64 | IGND3 | 45 | - | 25 | IGND7 | 6 | - |
| 63 | - | 44 | IGND4 | 24 | - | 5 | IGND8 |
| 62 | RX4+ | 43 | RX4- | 23 | RX8+ | 4 | RX8- |
| 61 | - | 42 | - | 22 | - | 3 | - |
| 60 | TX4+ | 41 | TX4- | 21 | TX8+ | 2 | TX8- |
| | | 40 | - | | | 1 | - |

***Table 3.*** *Pin assignment of the 78-pin front connector – RS485 mode, half duplex*




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 78 | - | 59 | - | 39 | IGND5 | 20 | - |
| 77 | - | 58 | - | 38 | - | 19 | - |
| 76 | - | 57 | - | 37 | - | 18 | - |
| 75 | - | 56 | - | 36 | - | 17 | - |
| 74 | D1+ | 55 | D1- | 35 | D5+ | 16 | D5- |
| 73 | IGND1 | 54 | - | 34 | - | 15 | - |
| 72 | - | 53 | IGND2 | 33 | - | 14 | IGND6 |
| 71 | - | 52 | - | 32 | - | 13 | - |
| 70 | - | 51 | - | 31 | - | 12 | - |
| 69 | D2+ | 50 | D2- | 30 | D6+ | 11 | D6- |
| 68 | - | 49 | - | 29 | - | 10 | - |
| 67 | - | 48 | - | 28 | - | 9 | - |
| 66 | - | 47 | - | 27 | - | 8 | - |
| 65 | D3+ | 46 | D3- | 26 | D7+ | 7 | D7- |
| 64 | IGND3 | 45 | - | 25 | IGND7 | 6 | - |
| 63 | - | 44 | IGND4 | 24 | - | 5 | IGND8 |
| 62 | - | 43 | - | 23 | - | 4 | - |
| 61 | - | 42 | - | 22 | - | 3 | - |
| 60 | D4+ | 41 | D4- | 21 | D8+ | 2 | D8- |
| | | 40 | - | | | 1 | - |

***Table 4.*** *Pin assignment of the 78-pin front connector – RS232 mode*




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 78 | - | 59 | - | 39 | IGND5 | 20 | - |
| 77 | DCD1 | 58 | - | 38 | DCD5 | 19 | - |
| 76 | DTR1 | 57 | RI1 | 37 | DTR5 | 18 | RI5 |
| 75 | RXD1 | 56 | DSR1 | 36 | RXD5 | 17 | DSR5 |
| 74 | TXD1 | 55 | CTS1 | 35 | TXD5 | 16 | CTS5 |
| 73 | IGND1 | 54 | RTS1 | 34 | - | 15 | RTS5 |
| 72 | DCD2 | 53 | IGND2 | 33 | DCD6 | 14 | IGND6 |
| 71 | DTR2 | 52 | RI2 | 32 | DTR6 | 13 | RI6 |
| 70 | RXD2 | 51 | DSR2 | 31 | RXD6 | 12 | DSR6 |
| 69 | TXD2 | 50 | CTS2 | 30 | TXD6 | 11 | CTS6 |
| 68 | DCD3 | 49 | RTS2 | 29 | DCD7 | 10 | RTS6 |
| 67 | DTR3 | 48 | RI3 | 28 | DTR7 | 9 | RI7 |
| 66 | RXD3 | 47 | DSR3 | 27 | RXD7 | 8 | DSR7 |
| 65 | TXD3 | 46 | CTS3 | 26 | TXD7 | 7 | CTS7 |
| 64 | IGND3 | 45 | RTS3 | 25 | IGND7 | 6 | RTS7 |
| 63 | DCD4 | 44 | IGND4 | 24 | DCD8 | 5 | IGND8 |
| 62 | DTR4 | 43 | RI4 | 23 | DTR8 | 4 | RI8 |
| 61 | RXD4 | 42 | DSR4 | 22 | RXD8 | 3 | DSR8 |
| 60 | TXD4 | 41 | CTS4 | 21 | TXD8 | 2 | CTS8 |
| | | 40 | RTS4 | | | 1 | RTS8 |

### Pin Assignments of 9-pin D-Sub Connectors

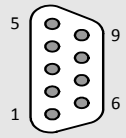
MEN offers an adapter cable to spread the 78-pin connector to eight standard 9-pin D-Sub plug connectors, one for each channel. The channels numbers (1..8) are marked on the cables.

The following tables give the pin assignments for the possible physical layers. The pinouts are standard for RS422, RS485 and RS232.

Connector types:

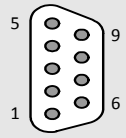
- 9-pin D-Sub plug according to DIN41652/MIL-C-24308, with thread bolt UNC 4-40
- Mating connector:
  9-pin D-Sub receptacle according to DIN41652/MIL-C-24308, available for ribbon cable (insulation piercing connection), hand-soldering connection or crimp connection

***Table 5.*** *Pin assignment of the 9-pin D-Sub adapter connector – RS422 mode*



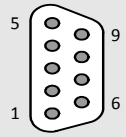

| | | | |
|---|---|---|---|
| 5 | IGND | 9 | RX- |
| 4 | RX+ | 8 | TX- |
| 3 | TX+ | 7 | - |
| 2 | - | 6 | - |
| 1 | - | | |

***Table 6.*** *Pin assignment of the 9-pin D-Sub adapter connector – RS485 mode*




| | | | |
|---|---|---|---|
| 5 | IGND | 9 | - |
| 4 | - | 8 | D- |
| 3 | D+ | 7 | - |
| 2 | - | 6 | - |
| 1 | - | | |

***Table 7.*** *Pin assignment of the 9-pin D-Sub adapter connector – RS232 mode*




| | | | |
|---|---|---|---|
| 5 | IGND | 9 | RI |
| 4 | DTR | 8 | CTS |
| 3 | TXD | 7 | RTS |
| 2 | RXD | 6 | DSR |
| 1 | DCD | | |

### 2.2.2 RS232 Interface

In the RS232 standard (DIN 66020, 66022, CCITT V.24) a High level is defined as a voltage of between +3V and +15V, a Low level as a voltage of between -3V und -15V. Data is always transmitted in negative logic.

The RS232 interface supports a transmission rate of up to 230,400 baud. The transfer rate is configurable (see Chapter 2.2.4.6 Supported Baud Rates on page 25).

In the RS232 interface specification six control lines are defined in addition to the two signal lines, which can be used for control of data interchange. The F216 supports all of these handshake lines.

The following table gives an impression of typical transmission lengths related to baud rates.

***Table 8.*** *RS232 transmission length related to baud rate*

| Max. Baud Rate [bits/s] | Max. Cable Length |
|---|---|
| 2,400 | 900 m |
| 4,800 | 300 m |
| 9,600 | 152 m |
| 19,200 | 15 m |
| 57,600 | 5 m |
| 115,200 | 2 m |
| 230,400 | < 1 m |

### 2.2.3 RS422/485 Interface

RS422 and RS485 are standard interfaces approved by the Electronic Industries Association (EIA) for connecting serial devices. The RS422 standard was designed to replace the older RS232 standard because it supports higher data rates and greater immunity to electrical interference. RS485 is similar to RS422 but can support more nodes per line because it uses lower-impedance drivers and receivers.

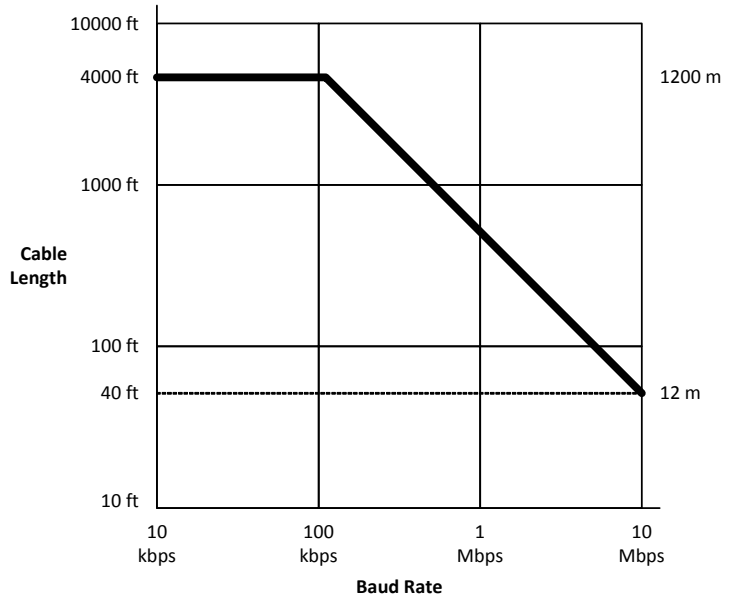
The RS422 interface allows data transmission rates up to 1.152 Mbaud over 60 m. (The F216 supports a maximum of 921.6 kbaud.) This reduces to 120 kbaud up to 1200 m. The RS422 interface is not only appropriate for point-to-point connections. "Party line" applications can also be implemented. In this case the line driver is designed in such a way that it can drive up to 10 line receivers at the same time.

Real "multipoint operation", however, is not permitted by the RS422 interface. This requires one single bus with several receivers and transmitters to be connected. For this purpose, the RS485 specification was created, which permits real multipoint operation with 32 transmitters and 32 receivers on one single bus, while including all specifications of the RS422 interface.

In theory, both RS422 and RS485 may be configured as 2- or 4-wire interfaces. However, for the most typical uses, F216 supports only full-duplex operation for RS422, and half-duplex operation for RS485. The difference between the two interface types is the number of nodes on one bus (multipoint operation, see above).

The following table gives an impression of typical transmission lengths related to baud rates.

***Figure 2.*** *RS422/RS485 transmission length related to baud rate*



### 2.2.4 Setting the Physical Layer

The eight UART channels can be configured individually as differential RS422 or RS485, or non-differential (single-ended) RS232 interfaces. The setting is made using driver software. For Windows MEN offers a driver installation package that allows easy configuration through the Device Manager. For Linux, VxWorks and QNX MEN also offers driver software that provides the necessary functions to write application software.

Please note that under Linux, VxWorks and QNX you should always load the driver with the desired parameter value for the respective physical layer. Otherwise the driver may change the F216's hardware start-up default stored in the non-volatile state saver!

The following chapters give hints on how to make settings under the supported operating systems.

#### 2.2.4.1 Configuration under Windows

MEN's driver installation package for Windows allows easy configuration through the Device Manager.

To do this, open the *Properties* page of each F216 UART device via the Windows Device Manager, select the *Port Interface* tab and choose the used physical interface.

You can find more details on the Windows driver installation package in the F216 under Windows User Manual.

You can download the Windows driver and user manual from MEN's website.

Note: Do not change from RS232 to RS422/485 when there is still a connection with the RS232 remote station. This will result in a blue screen because of continuous RS422/485 interrupts.

#### 2.2.4.2 Configuration under Linux

MEN provides a Linux driver that allows to configure the interface mode and baud rate.

You can find more details on MEN's Linux driver software in *Application Note: Using 16Z025_UART and 16Z125_UART under Linux* (21APPN009).

You can download the application note from MEN's website.

You can download the Linux driver from MEN's website.

The *baud_base* parameter must be set to 1843200.

MEN's Linux driver supports the following values for the *mode* parameter:

| | |
|---|---|
| **se** | single ended (RS232) |
| **df_fdx** | differential, full duplex (RS422) |
| **df_hdxe** | differential, half duplex, with echo (RS485) |
| **df_hdx** | differential, half duplex, no echo (RS485) |

The following examples show how to use the driver with F216.

**Set all UART ports to RS232 mode**

```
# modprobe men_lx_chameleon
# modprobe men_lx_frodo baud_base=1843200
mode=se,se,se,se,se,se,se,se,se
```

**Set all UART ports to RS422 full-duplex mode**

In order to change the settings, the driver needs to be removed first.

```
# modprobe men_lx_chameleon usePciIrq=1
# modprobe men_lx_frodo baud_base=1843200
mode=df_fdx,df_fdx,df_fdx,df_fdx,df_fdx,df_fdx,df_fdx,df_fdx,df_fdx
```

Note: Most Linux kernels only support 4 UARTs by default. If you need more than 4 UARTs, add parameter *8250.nr_uarts=48* to your kernel boot line in the bootloader or adjust kernel parameter *CONFIG_NR_8250_UARTS* and recompile the kernel.

### 2.2.4.3 Configuration under VxWorks

MEN provides a VxWorks driver that provides comprehensive I/O control support to configure the interfaces.

You can find more details on MEN's VxWorks driver software in the driver's included HTML documentation.

You can download the VxWorks driver from MEN's website.

The UART clock frequency must be set to 58982400. You can use driver function *Z25_CreateDevice* or *Z25_SetBaseBaud* to do this.

### 2.2.4.4 Configuration under QNX

MEN provides a QNX driver that allows configuration of the interfaces through QNX tool *stty*.

The *stty* tool together with MEN's QNX driver provides a large number of parameters to configure serial interfaces. MEN's driver includes options to set the physical interface itself. You can get details on the driver using QNX command *use devc-serz025*.

You can download the QNX driver from MEN's website.

To get details on the driver use QNX command *use devc-serz025*.

You can find more information on *stty* also on the QNX developer community website.

### 2.2.4.5 Start-Up Default Setting

The F216 has a start-up default setting for the physical layer of each channel, which is hardware-coded by means of a non-volatile state saver. The factory default is RS422. The state saver always stores the configuration that is present at power-off. This way you do not need to make any additional settings apart from software configuration in order to change the default interface.

Please note that the driver software for the various operating systems may have default physical interfaces different to the F216 hard-coded default. You should make sure that your application software selects the right interface for each channel, especially under Linux, VxWorks and QNX.

### 2.2.4.6 Supported Baud Rates

The F216 provides highly accurate baud rates. The following baud rates are supported and tested[1].

***Table 9.*** *Supported and tested baud rates*

| Desired Baud Rate [bits/s] | Supported with | | |
|---|---|---|---|
| | RS422 | RS485 | RS232 |
| 110 | x | x | x |
| 300 | x | x | x |
| 1200 | x | x | x |
| 2400 | x | x | x |
| 4800 | x | x | x |
| 9600 | x | x | x |
| 19200 | x | x | x |
| 38400 | x | x | x |
| 57600 | x | x | x |
| 115200 | x | x | x |
| 230400 | x | x | x |
| 460800 | x | x | |
| 921600 | x | x | |

Please note that at higher baudrates the system performance has to be sufficient to process the receive interrupts fast enough to prevent the internal FIFOs from overrunning. It may also be reasonable to reduce the FIFO trigger levels of the F216 UARTs.

[1] Other settings are possible but are not tested.

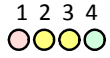
## 2.3 Front-Panel LEDs

The F216 has four status LEDs at the front panel. Three of them are controlled through the onboard FPGA (MEN standard 16Z034_GPIO controller). These lines are user LEDs driven by GPIO lines 0, 1 and 2. Programming these signals as outputs and driving them to logic 0 means the LED is turned on.

You can control the GPIO lines for the three user LEDs using MDIS4 driver software available on MEN's website.

The green *FPGA configured* LED lights up as soon as the FPGA is loaded, i.e. when the UART interfaces are ready for operation.

***Table 10.*** *Front-panel LEDs*

| | LED No. / Color | Function |
|---|---|---|
|  | 1 - red | User LED, controlled through GPIO0 |
| | 2 - yellow | User LED, controlled through GPIO1 |
| | 3 - yellow | User LED, controlled through GPIO2 |
| | 4 - green | FPGA configured, lights up when the FPGA is loaded, **not** GPIO-controlled |

## 2.4 CompactPCI Interface

The F216 supports a 32-bit 33-MHz CompactPCI interface fully compatible with CompactPCI specification PICMG 2.0 Rev. 3.0. The board works with 3.3V and tolerates 5V V I/O.

For full CompactPCI functionality only the J1 connector is needed, therefore the board only has a J1 connector to the bus.

Connector type of J1:

- 110-pin shielded, 2mm-pitch, 5-row receptacle according to IEC 917 and IEC 1076-4-101

The pin assignment of connector J1 as defined in the CompactPCI specification will not be repeated here.

# 3 Appendix

## 3.1 PCI Configuration

The F216 has the following IDs on the PCI bus:

- PCI Device ID: 0x4D45
- PCI Vendor ID: 0x1A88
- Subsystem Device ID: 0x5A14
- Subsystem Vendor ID: 0x0072

## 3.2 Literature and Web Resources

- F216 data sheet with up-to-date information and documentation:
  www.men.de/products/02F216-.html

### 3.2.1 CompactPCI

- CompactPCI Specification Revision 2.0 R3.0:
  1997; PCI Industrial Computers Manufacturers Group (PICMG)
  www.picmg.org
- PCI Local Bus Specification Revision 2.2:
  1995; PCI Special Interest Group
  P.O. Box 14070
  Portland, OR 97214, USA
  www.pcisig.com

## 3.3 Finding out the Board's Article Number, Revision and Serial Number

MEN user documentation may describe several different models and/or hardware revisions of the F216. You can find information on the article number, the board revision and the serial number on two labels attached to the board.

- **Article number:** Gives the board's family and model. This is also MEN's ordering number. To be complete it must have 9 characters.
- **Revision number:** Gives the hardware revision of the board.
- **Serial number:** Unique identification assigned during production.

If you need support, you should communicate these numbers to MEN.

***Figure 3.*** *Labels giving the board's article number, revision and serial number*